



Forest Health Protection Pacific Southwest Region



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To: Sheri Smith, Regional Entomologist, Pacific Southwest Region USFS

Subject: Trip report following initial site visit to St. Herman of Alaska Monastery, Platina, CA.

At the request of Brother Donnan, St. Herman of Alaska Monastery, a site visit was made to the St. Herman Monastery near Platina, California on April 30, 2014. The objectives were to assess the current stand and identify insect and disease that may be causing mortality in the surrounding ponderosa pine. Brother Donnan and Father Martin (St. Herman of Alaska), and Cynthia Snyder (FHP) were present.

Background

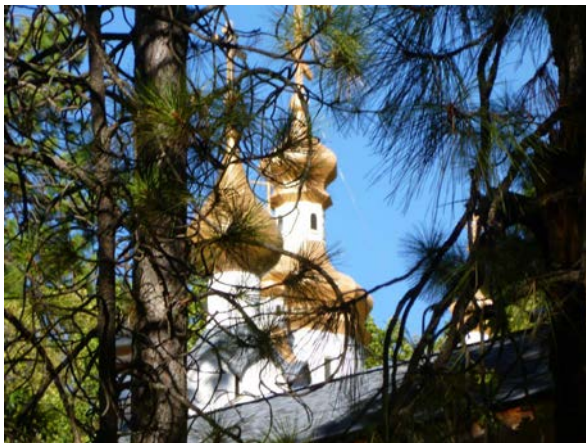


Figure 1. Domes in the pines (from <http://sainthermanmonastery.org/about-us/>).

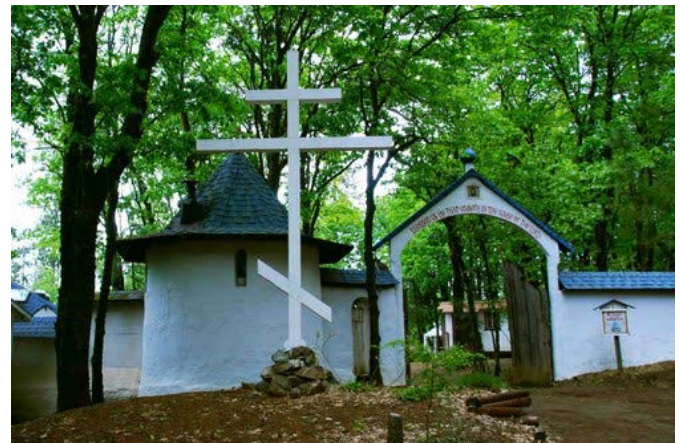


Figure 2. St. Herman Monastery main entrance; mostly oak vegetation seen from the main gate.

From the St. Herman website (<http://sainthermanmonastery.org/about-us/>): “In 1963, the St. Herman of Alaska Brotherhood was founded with the blessing of St. John Maximovitch, Archbishop of San Francisco and Western America (Russian Orthodox Church Outside of Russia) as a missionary brotherhood for the dissemination of the Orthodox Faith, primarily through the printed word. The brotherhood chose as its patron a holy missionary monk of the American land, Fr. Herman of Alaska, who would later be glorified as a saint of the Orthodox Church. In 1969 the brotherhood moved to the mountains of northern California in order to pursue a monastic life in the wilderness. The following year, the first monks were tonsured, marking the beginning of the St. Herman

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of Alaska Monastery.” The monastery is located 1¾ miles up Beegum Gorge Road in Platina, in the southwest corner of Shasta County at 40°20'49.3"N and 122° 54'00. 8"W

The monastery consists of a variety of buildings none of which have power or plumbing that are heated by wood stoves. Firewood is plentiful as the monastery sits at an elevation of approximately 3200 ft. and is primarily oak woodland with a mix of ponderosa pine (Figures 1 and 2). The monks have been actively managing the forest within and surrounding the buildings by pruning and removing obvious hazards. The original founder, Father Seraphim Rose refused to allow cutting of trees to maintain the wilderness character of the monastery.

Observations and Discussions

Aerial survey data over the past two years (2012-2013) have shown limited mortality in ponderosa pine within a five mile radius of the monastery and none within two miles. Upon arrival, I noticed heavy amounts of dwarf mistletoe in the ponderosa pines (*Arceuthobium campylopodum*) around the monastery grounds. Dwarf mistletoe ratings of 3-5 were not uncommon throughout with brooming evident. All trees, regardless of size had some level of infection with many pole-size and larger exhibiting stem cankers



Figure 3. Witches brooms caused by dwarf mistletoe infection.



Figure 4. Stem canker caused by dwarf mistletoe with sequoia pitch moth.

and witches brooms (Figures 3 and 4). Lowered life expectancy, increased hazard from defect, poor growth, and diminished esthetic value are some of the losses these parasitic plants may cause. Most new infections result as spread from overstory trees to smaller trees. Spread can also occur between nearby trees of similar crown class, especially if they are within 35 feet of each other. Attempts to eradicate the dwarf mistletoe by pruning and thinning trees with this level of infection would most likely be unsuccessful.

There was evidence of Sequoia pitch moth (*Synanthedon sequoia*) where many stem cankers had split the bark and were oozing pitch (Figure 4). By itself, Sequoia pitch moth rarely causes mortality to large trees and the pitch is being used by some of the monks as incense in the monastery.

We discussed dwarf mistletoe management and it was determined that the best course of action, taking into consideration the desire to keep the pines as long as possible and the extent of infections, was to prune affected branches aggressively up to the bole and remove trees as they become hazards in the compound. I also warned them that due to the spread of seed from the larger trees, they should expect smaller trees to become infected and succumb over time. The result will most likely be oak woodland without the pine mix. This led to discussions of the leafy mistletoe in the oak. It was suggested that heavily infected branches be pruned to the bole to slow the spread.

Tree mortality due to western pine beetle was found in a small patch, 2 trees, at the north end of the main grounds (Figure 5) and another patch, 3 trees, about 800 ft. up Beegum Gorge Road. Brother Donnan reported more mortality pockets similar to these further up the road in less accessible areas. In these cases it is thought that the beetles are responding to poor site, drought conditions, and possibly other factors. The trees at the north end were infected with dwarf mistletoe which may have helped lead to the early demise of the trees. I suggested monitoring patches for spread and removing hazards as they occur.



Figure 5. Ponderosa pine mortality at north end of main compound caused by western pine beetle.

If you have any questions regarding this report and/or need additional information, please contact Cynthia Snyder at 530-226-2437 or Pete Angwin at 530-226-2436.

/s/ Cynthia Snyder

CC: St. Herman of Alaska Monastery general e-mail, Chris Fischer, Sherry Hazelhurst, Sheri Smith, and Phil Cannon

Western dwarf mistletoe (*Arceuthobium campylopodum*)

Hosts

Western dwarf mistletoe primarily infects ponderosa pine and Jeffrey pine.

Life Cycle

Female *A. campylopodum* plants produce numerous fruits (capsules) at the ends of relatively large and well developed aerial shoots. Inside of each capsule is a single seed. Fruits mature in late September and seeds are forcibly expelled from capsules as they detach from the aerial shoots. Seeds may be discharged for maximum distances of 120 to 130 feet, but effective spread is usually less than 35 feet from the tops of overstory trees and 20 feet from smaller trees. Initial velocity is about 90 feet/second, generated by high hydrostatic pressure within the fruit. Seeds have a viscous coating that causes them to adhere to almost anything they happen to hit.

Seeds that have stuck to pine needles will slide with gravity as moisture lubricates the viscous coating. Depending on needle orientation, some seeds may fall to the ground while others will slide to the fascicle at the base of the needle and remain there over winter. In the spring, seeds that eventually cause infection will germinate, each producing a single radicle that penetrates the cortex of the host on the branch and develops into haustorial strands. From these, sinkers are produced that penetrate the cambium and current year xylem. The haustorial strand network is called the endophytic system and it is perennial, remaining active as long as the host tissue is alive.

During the summer of the second year, swelling may begin to appear at the site of infection. A year later, again in the summer, the first aerial shoots may start to appear, although in some cases, several years may elapse between infection and production of aerial shoots. Another year or two may pass between initial production of aerial shoots and flowering. Aerial shoots are branched, average 3 inches in length but may be up to 5 inches long, and are produced on very pronounced spindle-shaped swellings on branches, and less frequently on boles of small trees. The development and persistence of large brooms indicate decades of infection.

Effects

Understory pine are readily infected and can be affected by substantial impacts. Probability of dwarf mistletoe infection is largely a function of the infection hazard and the size of the susceptible tree; the larger the individual, the greater the probability of intercepting mistletoe seeds. Mortality is not common on lightly or moderately infected trees on better pine sites in the region. After developing severe levels of infection, individual trees may grow poorly for decades before eventually being killed. Often other pests, especially bark beetles, actually kill these weakened trees.

Western Pine Beetle (*Dendroctonus brevicomis*)

Hosts

The western pine beetle can attack and kill ponderosa and Coulter pine trees of all age classes that are 6 inches or larger in diameter, including apparently healthy trees.

Life Cycle

Western pine beetles pass through the egg, larval, pupal, and adult stages during a life cycle that varies in length from about 2 months in warm weather to 10 months in cool weather. All stages are completed beneath or in the bark of infested trees, except for a brief period when the adults fly to find new trees to attack.

In the northern part of their range and at higher elevations, the beetles produce two generations each year, with attacks in early June and late August. In the South and at lower elevations, the beetles produce three and sometimes four generations each year.

During an attack period, which may last 3 weeks, each female lays about 60 tiny white eggs individually in niches cut into the sides of the egg gallery under the bark. Some of these parent females may emerge and reattack to establish additional galleries elsewhere in the same tree or in other host trees. After incubating from 1 to 2 weeks, the eggs hatch.

The larvae are small white grubs that feed first in the phloem. They then mine into the middle bark where most of their development takes place. After completing four larval stages, they transform into pupae and then into adults. Once the adult insects emerge, they are ready to renew the attack-infestation cycle in living trees.

When the female beetles successfully attack a tree, they release minute amounts of behavioral chemicals into the air. These odors (pheromones) attract males and other females to the tree, causing a mass attack that tends to overcome the tree's natural resistance. If numerous beetles are flying and fair weather persists, adjacent trees may be attacked, resulting in a group of infested trees.

Effects

Group killing of trees is common in dense, overstocked stands of pure, even-aged, young sawtimber, but also occurs among dense clumps of pine in stagnating mixed-conifer stands. Usually, the beetles breed in and kill scattered, overmature, slow-growing, decadent, or diseased trees and trees weakened by stand stagnation, disease, lightning, fire, or mechanical injury. This tree mortality need not be a loss, but may be considered part of the normal ecological process of succession through which a forest matures and replaces itself. Some of the trees killed under these conditions, however, may be on residential or recreation sites. These highly prized trees are often impossible to replace and expensive to remove.

Sequoia pitch moth (*Synanthedon sequoia*)

Hosts

Douglas-fir and most pine species of Northern California

Life Cycle

Most pitch moth individuals require two years to develop from egg to adult. Because not all pitch moths emerge from pupae at the same time, adults can be present anytime from May through early September. Adults emerge earlier at warmer inland sites and later at cooler sites near the coast. Peak emergence occurs in June and July.

Adults live only a few days, during which they mate, and females lay eggs individually on bark, usually in crevices around pruning wounds and other injury sites. Eggs are 1/16 inch in diameter, reddish brown, oval, and somewhat flattened. They hatch in about two weeks.

The insect spends most of its life in the larval stage. The dirty white, grayish, or pink larva feeds for months, excavating a shallow cavity that penetrates the inner bark to the cambium surface of wood. After feeding as a larva, the pitch moth develops into dark brown pupa that is about 3/4 inch long. The pupa sits in a chamber within the pitch mass for about a month, then moves to the surface just before the adult emerges.

Effects

Pitch moth larval feeding causes infested conifers to produce copious amounts of resin that form globular masses on bark. Larvae cause very little injury to cambium or wood; this damage usually does not cause girdling of the trunk and rarely kills trees. Larval feeding sometimes causes one or more limbs to die or break, especially if infested trees are young. Sequoia pitch moth is the more common of these *Synanthedon* spp. and is usually the only one that is managed. It frequently attacks pines with pruning wounds or other injuries.

Infestations are recognizable by the gray, pink, reddish, or yellowish pitch masses that protrude from infested trunks and limbs. Pitch masses initially are small, soft, glistening, and reddish brown to pink. As the larva feeds and grows beneath each mass, the gummy exudate enlarges, hardens, and becomes darker gray. A brownish pupal case may protrude from the mass after the larva has matured and emerged as an adult. Old pitch masses can remain on bark for several years. Abandoned pitch masses are often reinfested because egg-laying females are attracted to these injury sites.